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FRANK SHIPLEY COLLINS

MERRITT LYNDON FERNALD } Associate Editors.

HOLLIS WEBSTER

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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A REMARKABLE COLONY OF BIDENS IN CONNECTICUT.

M. L. FERNALD.

IN September, 1910, Messrs. R. W. Woodward and C. H. Bissell collected on the strand of Lake Pocotopaug at Chatham, Connecticut, material of an abundant *Bidens* which was afterwards, in 1915, referred to the writer for his opinion. The plants were of two quite definite strains and superficially somewhat resembled *B. connata* Muhl., var. *petiolata* (Nutt.) Farwell in its most extreme development, the oblong to lance-ovate leaves being all on very slender elongate petioles. Unlike any form of *B. connata*, however, all the material from Pocotopaug Lake was consistent in having the achenes quite flat and always two-awned, exactly matching the achenes of *B. heterodoxa* (Fernald) Fernald & St. John,¹ a species hitherto known only from maritime habitats on Prince Edward Island and the Magdalen Islands.

As above stated, there were two distinct strains of the plant from Pocotopaug Lake, the larger plants having the two awns of the achene consistently retrorse-barbed, as in most species of *Bidens*, and in this exactly matching the achenes of *Bidens heterodoxa*, var. *orthodoxa*; the smaller plant of the strand (mostly much smaller than the plant with retrorsely-barbed awns) having the awns quite smooth and barbless or at most with very obscure suggestions of barbs, appearing as a slight scabrous tendency on the awns. These plants, presenting, as they did, the achene-characters of *B. heterodoxa*, a species known only from subsaline situations about the Gulf of St.

¹ Fernald & St. John, RHODORA, xvii. 23 (1915).

Lawrence, were naturally very perplexing since it would be surprising, at least, to find *B. heterodoxa* upon an inland lake of Connecticut. Consequently, plans were made for the writer to join Mr. Woodward in a further field-study of the colony. Unfavorable weather, however, forced the abandonment of this plan and on September 21, 1915, Mr. Woodward alone visited the station and collected an abundant series of specimens, many sheets of which have been generously supplied to the writer; and these plants in all their characters agree with the earlier collections.

A close study of the material shows it to have exactly the achene of *B. heterodoxa* and to be consistently two-awned. A check-study of *B. connata* and its varieties shows that in that species all well developed central achenes of the heads are consistently 4-awned and with the highly developed mid-ribs becoming almost wing-like in maturity. It would appear, then, that the Pocotopaug Lake material must, at least for the present, be placed with *B. heterodoxa*, although it is geographically remote from the type region of the latter species. In this geographic isolation, however, the plant is comparable with many other characteristic species of Prince Edward Island, the Magdalen Islands and eastern New Brunswick, which are outlying representatives of austral types isolated by hundreds of miles from the nearest known stations to the south,¹ and it is probable that further exploration, especially in the coastwise strip of southern New England, will reveal colonies of *B. heterodoxa* in the intermediate area.

In typical *B. heterodoxa* the leaves are either simple or 3-5-parted, the blades of the simple leaves or the terminal lobes of the cleft ones being narrowly lanceolate to narrowly ovate and very sharply (almost jaggedly) serrate. In the Connecticut material, however, the leaves as above stated, strongly resemble those of *B. connata*, var. *petiolata*, or, in some cases, typical *B. connata*, the simple leaves being oblong-lanceolate to ovate-lanceolate and rather bluntly dentate, the cleft leaves with the terminal lobe of this form; and in all the plants the leaves are on very elongate slender petioles. Furthermore, the Connecticut material has the flowering branches highly developed but very short in the axils, most of these branches being much shorter

¹ For example: *Carex varia* Muhl., abundant on Prince Edward Island but unknown nearer than Hancock Co., Maine; *Rumex persicarioides* L. (See St. John, RHODORA, xvii. 80) of the lower St. Lawrence, Quebec, Prince Edward Island, and eastern Massachusetts; and *Aster subulatus* Michx., var. *obtusifolius* Fernald, RHODORA, xvi. 61, of northeastern New Brunswick, there representing *A. subulatus*, which reaches its northern limit in southern New Hampshire.

than the subtending leaves. In this peculiar habit and in the foliage the plants are well characterized and it seems wisest to give them a varietal designation, although it is freely admitted that at present we do not know of transitional colonies. The two plants of Pocotopaug Lake may, then, be called

BIDENS HETERODOXA (Fernald) Fernald & St. John, var. **monardaefolia**, n. var., planta racemose ramosa, ramis brevibus axillaribus; foliis simplicibus vel 3-partitis longe petiolatis, laminis vel lobis terminalibus oblongo-lanceolatis vel lanceolato-ovatis grosse dentatis; aristis acheniorum retrorse setosis.

Plant racemosely branched; branches short, axillary: leaves simple or 3-parted, long-petioled; the blades or terminal lobes oblong-lanceolate or lance-ovate, coarsely dentate: awns of the achenes retrorsely setose.—CONNECTICUT: strand of Lake Pocotopaug, Chatham, September 21, 1910 and September 21, 1915, *R. W. Woodward* (TYPE in Gray Herb.).

B. HETERODOXA, var. **agnostica**, n. var., habitu foliisque ut apud var. *monardaefolia*; aristis acheniorum laevibus vel obsolete scabris.

Habit and foliage as in var. *monardaefolia*: awns of the achenes smooth or obscurely scabrous.—CONNECTICUT: strand of Pocotopaug Lake, Chatham, September 21, 1910, *R. W. Woodward* and *C. H. Bissell* (TYPE in Gray Herb.); September 21, 1915, *R. W. Woodward*.

GRAY HERBARIUM.

ARENARIA LATERIFLORA AND ITS VARIETIES IN NORTH AMERICA.

HAROLD ST. JOHN.

IN 1862 Regel, after studying Eurasian and Alaskan specimens, described a series of varieties of *Möhringia lateriflora* (L.) Fenzl, using as diagnostic characters the shape and the pubescence of the leaves. The occurrence of one of these varieties in a collection of plants recently made in northern Manitoba by Mr. J. H. Emerton has involved the writer in a study of the Eurasian and North American material of this species and has led him to the belief that the seemingly artificial characters used by Regel do really define recognizable categories whose distributions are similar to those of many other boreal types.

Consequently it has seemed worth while to systematize the American treatment of this species and to make the necessary new combinations under *Arenaria*, in which genus the species seems properly placed. The differences between the varieties are stated in the following key:

- A. Leaves elliptical or ovate-lanceolate.
 B. Leaves puberulent on the margins and on the midribs beneath, or occasionally puberulent throughout.
 1. *A. lateriflora* L., var. *typica* (Regel) St. John.
 B'. Leaves glabrescent or glabrous.
 2. *A. lateriflora* L., var. *glabrescens* (Regel) Robinson.
 A'. Leaves linear, linear-elliptic, or linear-lanceolate.
 C. Leaves puberulent on the margins and the midribs beneath, occasionally puberulent throughout.
 3. *A. lateriflora* L., var. *angustifolia* (Regel) St. John.
 C'. Leaves glabrous. 4. *A. lateriflora* L., var. *Taylorae* St. John.

It will be seen that Regel's β . *intermedia* has not been taken up. It has not seemed advisable to try to separate the broad, pubescent-leaved plants into those with "elliptical obtuse or rarely acute leaves" (Regel's *a. typica* sensu stricto) as opposed to those with "oblong-elliptic or oblong-lanceolate obtuse or rarely acute leaves" (Regel's β . *intermedia*). If such a distinction can be drawn, it does not seem to be of any taxonomic or phytogeographic importance.

1. *ARENARIA LATERIFLORA* L., var. **typica** (Regel) n. comb. *Möhringia lateriflora* (L.) Fenzl, var. *typica* Regel, Fl. Ostsibirien i., Bull. Soc. Nat. Mosc. xxxv. 377 (1862).—Perennial with slender terete minutely retrorsely pubescent stems which are simple or freely branching especially at the base, 0.5–4 dm. high: leaves bright green, opposite, entire, sessile, slightly connate, elliptical or ovate lanceolate, puberulent on the margins and on the midribs beneath, occasionally throughout, 5–30 mm. long, 3–14 mm. wide: inflorescence lateral or becoming so, cymes one or more borne from the upper axils, 1–6-flowered; pedicels subtended by minute paired bracts, one or more of the uppermost pedicels bibracteolate near the middle; sepals green, hyaline-margined, ovate, obtuse, glabrous, 2–3 mm. long; petals usually exceeding the sepals 2–3 times.¹—Abundant on gravelly and turfy shores, in thickets and borders of woods, and meadows, Arctic America south to Pennsylvania, Ohio, Ill., S. Dakota, Missouri, and the mountains of Montana, Idaho, Colorado, Utah, New Mexico, Washington, and Oregon; also in boreal Eurasia. A few typical specimens in the Gray Herbarium and the Herbarium of the New England Botanical Club are cited below:

LABRADOR: springy banks and damp hillsides, Forteau, July 30, 1910, *M. L. Fernald & K. M. Wiegand*, no. 3,347. NEWFOUNDLAND:

¹For notes on the variations in the size and proportions of the floral parts, see Woodward, R. W.: RHODORA xv. 209–10 (1913).

Hollen says scarcely worth separating
 Fl. Kant. 2: 87. 1918. — At the extreme
 are compresses and have restricted ranges.
 I still think them ok.

grassy strand of Ingornachois Bay, August 2, 1910, *M. L. Fernald & K. M. Wiegand*, no. 3,346. QUEBEC: wet thicket, Brion Island, Magdalen Islands, August 5, 1914, *Harold St. John*, no. 1,869. PRINCE EDWARD ISLAND: sandy thickets, Morell, June 29, 1914, *M. L. Fernald & Harold St. John*, no. 11,051. NEW BRUNSWICK: alder thicket, Shediac Cape, July 3, 1914, *F. T. Hubbard*. NOVA SCOTIA: damp thicket, near Pictou, July 12-18, 1901, *C. D. Howe & W. F. Lang*, no. 461. MAINE: moist field, Roque Bluffs, July 8, 1907, *C. H. Knowlton*. NEW HAMPSHIRE: Isle of Shoals, *Oakes & Robbins*. VERMONT: Rutland, *W. W. Eggleston*, no. 1,073. MASSACHUSETTS: low ground, Eastern Point, Gloucester, June 7, 1896, *E. L. Rand & B. L. Robinson*. RHODE ISLAND: low grounds near beach, Westerly, June 7, 1913, *R. W. Woodward*. CONNECTICUT: moist woods, Guilford, June 17, 1906, *G. H. Bartlett*. NEW YORK: on mounds in sandy pasture, south side of Oneida Lake, Lenox, June 6, 1900, *J. V. Haberer*, no. 120. PENNSYLVANIA: swamp near Lancaster, June 1, 1860, *T. C. Porter*. ONTARIO: Kingston, June 14, 1902, *J. Fowler*. MICHIGAN: Dickinson's Island in Lake St. Clair, Port Huron, June 18, 1899, *C. K. Dodge*. OHIO: Port Clinton, May 16, 1898, *E. L. Moseley*. ILLINOIS: cliffs and open woods, Starved Rock, June 1-7, 1909, *J. M. Greenman, O. E. Lansing, Jr., & R. A. Dixon*. MANITOBA: Churchill, Hudson Bay, August 5, 1910, *J. M. Macoun, C. G. S.*, no. 79,086. MINNESOTA: Twin Lake, May 1891, *E. P. Sheldon*. NORTH DAKOTA: dry ground, Portal, June 13, 1903, *M. A. Barber*, no. 348. SOUTH DAKOTA: Elk Canon, altitude 4,000-5,000 feet, June 29, 1892, *P. A. Rydberg*, no. 568. SASKATCHEWAN: 1858, *E. Bourgeau*, no. 14. ALBERTA: dry prairie, Calgary, June 19, 1903, *M. A. Barber*, no. 224. MONTANA: Big Fork, July 22, 1908, *Mrs. Joseph Clemens*. IDAHO: frequent on dry soil, head of Little Potlatch River, June 16, 1892, *J. H. Sandberg, D. T. MacDougal, & A. A. Heller*, no. 399. WYOMING: aspen copses on the hillsides, Glen Creek, Yellowstone Park, June 30, 1899, *A. & E. Nelson*, no. 5,588. UTAH: wet canyon bottom, Pine Flats, July 11, 1912, *E. P. Walker*, no. 239. NEW MEXICO: Rio Pecos, below Winsor's Ranch, altitude 8,200 feet, July 1, 1908, *P. C. Standley*, no. 4,163. WASHINGTON: near Rock Lake, altitude 550 m., May 30, 1893, *J. H. Sandberg & J. B. Leiberger*, no. 123. BRITISH COLUMBIA: Avalanche Path, Emerald Lake, Selkirk Mountains, altitude 4,400 feet, *C. F. Shaw*, no. 92. YUKON: common in shady places, Dawson, June 7, 1914, *Alice Eastwood*, no. 160a. ALASKA: Unalaska, *Eschscholtz*.

2. *A. LATERIFLORA* L., var. *GLABRESCENS* (Regel) Robinson, in Synopt. Fl. i. part 1. 238 (1897). *Möhringia lateriflora* (L.) Fenzl, *γ glabrescens* Regel, Fl. Ostsibirien i., Bull. Soc. Nat. Mosc. xxxv. 378 (1862).—Resembling the var. *typica* in the shape of the leaves, but differing in having them glabrate or glabrous, and often thinner and brighter green.—Apparently this variety is commoner in northern Asia than it is in North America. Only two collections of it from this continent have been seen by the author.

IDAHO: willow copses, House Creek, Owyhee Co., June 28, 1912, *A. Nelson & J. F. Macbride*, no. 1,758. COLORADO: Leroux Creek, Delta County, altitude 9,500 feet, July 10, 1892, *J. H. Cowen*, no. 81.

3. *A. LATERIFLORA* L., var. ***angustifolia*** (Regel) n. comb. *Möhringia lateriflora* (L.) Fenzl, *δ angustifolia* Regel, Fl. Ostsibirien i., Bull. Soc. Nat. Mosc. xxxv. 378 (1862). In greater part *A. lateriflora* L., var. *tenuicaulis* Blankinship, Montana Agric. College Sci. Studies, Botany, i. 51 (1905).—Like the var. *typica* except in having linear, linear-elliptic, or linear-lanceolate leaves, 10–26 mm. long, 2–6 mm. wide.—Growing with or replacing the var. *typica* in western Canada, the Rocky Mountains, southern Labrador, and south along the New England coast.

ALBERTA: river bottom, Calgary, June 18, 1903, *M. A. Barber*, no. 191. SASKATCHEWAN: Wood Mountain Post, June 12, 1895, *J. Macoun*, C. G. S., no. 10,101. MANITOBA: mile 214, Hudson Bay Railway, July 8, 1917, *J. H. Emerton*. MONTANA: Flathead Lake, July 6, 1902, *M. J. Elrod*, no. 154; descent to Ross' Hole, July 26, 1880, *S. Watson*. UTAH: moist bank, altitude 8,000 feet, La Sal Mountains, June 13, 1914, *E. Payson*. QUEBEC: Seven Islands, August 2, 1907, *C. B. Robinson*, no. 663. MAINE: dry meadow, Hamilton Cove, Lubec, August 2, 1909, *M. L. Fernald*, no. 1,754. MASSACHUSETTS: Yarmouth, May 31, 1903, *J. Murdoch, Jr.*, no. 1,312. RHODE ISLAND: low grounds near beach, Westerly, July 11, 1913, *R. W. Woodward*; in woods, east side of Abbot Run, Cumberland, May 29, 1892, *J. F. Collins*.

4. *A. LATERIFLORA* L., var. ***Taylorae*** n. var., foliis glabris. Cetera ut apud var. *angustifolia*.

Resembling var. *angustifolia*, but having glabrous leaves.—Known only from the region of the delta of the Mackenzie River, where it was twice collected by Miss Elizabeth Taylor. To her, in recognition of her collecting in several high northern regions, the variety is dedicated.

NORTH WEST TERRITORIES: Peel's River Post, near the Mackenzie delta, July 13, 1892, *Miss E. Taylor*, no. 27; Peel's River near the Mackenzie delta, July 15, 1892, *Miss E. Taylor*.

In the treatment of this group in the Synoptical Flora¹ Dr. Robinson cited one of these two sheets as var. *glabrescens*. Later Blankinship included this number in his var. *tenuicaulis*. Blankinship at some time annotated on one of the two sheets, "near var. *angustifolia* (Regel) l. c., J. W. B." It will be seen that this collection has been a thorn in the flesh of the students of this group, and in view of the characters stated in the foregoing description, the author feels justified in describing it as a new variety.

GRAY HERBARIUM.

¹ Synopt. Fl. i. part 1. 238 (1897).

NOTES ON NEW ENGLAND HEPATICAE,—XIV.¹

ALEXANDER W. EVANS.

IN 1915 Warnstorf² described and figured as a new species, under the name *Sphenolobus ascendens*, a specimen collected by Miss Lorenz at Waterville, New Hampshire. The specimen had been sent him as *Scapania glaucocephala* (Tayl.) Aust., but he failed to find the *Scapania* and suggested that there might have been an error in the determination. The Waterville material had been named by the writer, and had served as the basis for his observations on *S. glaucocephala*, published in 1909.³ In view of a possible error this material has been carefully reexamined, but there seems to be no reason for revising the original determination. Mixed with the *Scapania*, however, are several other species of Hepaticae, such as *Cephalozia curvifolia*, *Jamesoniella autumnalis*, *Harpanthus scutatus*, and *Lophozia porphyroleuca*. The last species occurs as a slender gemmiparous form and is not abundant, but the few plants present agree with Warnstorf's description and figures of *Sphenolobus ascendens*. The writer would therefore regard the *Sphenolobus* as a synonym of the *Lophozia*.

During the past two years Miss Lorenz⁴ has recorded a number of species additional to the hepatic floras of Maine, New Hampshire, and Vermont, respectively. These species, with a single exception, were found by Miss Lorenz herself. The additions for Maine, collected on Mt. Ktaadn, are *Cephaloziella bifida*, *C. byssacea* (listed as *C. Starkii*), *Gymnomitrium corallioides*, *Lophozia Kunzeana*, *Nardia Geoscyphus*, and *Scapania dentata*. The only addition for New Hampshire, collected along the Connecticut River at Claremont, is *Riccia arvensis*. The additions for Vermont, collected at various localities, are *Riccia arvensis*, *R. Frostii* (first record for New England), *Ricciella crystallina*, *Cephalozia macrostachya*, *Lophozia heterocolpa*, *L. longidens*, and *Radula tenax*.

Attention should likewise be called to an interesting observation

¹ Contribution from the Osborn Botanical Laboratory.

² *Hedwigia* 57: 63. f. 2. 1915.

³ *RHODORA* 11: 194. 1909.

⁴ *Bryologist* 20: 43-45. 1917; Vermont Bot. & Bird Clubs, Joint Bull. 2: 14. 1916; Joint Bull. 3: 7, 8. 1917.

by Howe¹ on *Riccia Lescuriana*. According to his studies this species, published by Austin in 1869, is a synonym of *R. Beyrichiana* Hampe, published by Lehmann in 1838. The species, therefore, should bear the earlier name.

In the present series of Notes the following three species are recorded from New England for the first time: *Scalia Hookeri*, *Harpanthus Flotowianus*, and *Calypogeia fissa*. The distinctive features of these species are discussed, further mention is made of *Riccia Frostii*, and several additions to local state floras are given.

1. *RICCIA FROSTII* Aust. Bull. Torrey Club 6:17. 1875. *R. Watsoni* Aust. l. c. *R. Beckeriana* Steph. Bull. Herb. Boissier 6:374. 1898. Clayey banks of the Connecticut River, Ascutneyville, Weathersfield, Vermont, July 15, 1916 (*A. Lorenz*). The species has a wide distribution in North America and the following stations may be cited from the literature: Genesee Falls, Rochester, New York, 1868 (*P. T. Cleve*); near Painesville, Ohio (*H. C. Beardslee*); Illinois (*J. Wolf*); Bloomington, Indiana (*C. L. Black*); banks of the Missouri River, St. Charles, Missouri (*C. H. Demetrio*); Manhattan, Kansas (*W. A. Kellerman*); South Dakota (*Williams*); Great Falls, Montana (*F. W. Anderson*); Colorado (*J. Wolf*); near Denver, Colorado (*C. C. Parry*, *E. Bethel*); Idaho (*J. B. Leiber*); Nevada (*S. Watson*). The last named specimen, sent to Austin by C. C. Frost, should be regarded as the type of the species.

In 1898 Heeg² announced the occurrence of the species from the following localities in the Old World: Sarepta, Russia (*A. Becker*); Vienna, Austria (*A. Pokorny*); Gorelevo, Fatjanova and Polovinka, Siberia (*H. W. Arnell*). In 1912 Massalongo³ recorded it from two stations in Italy, namely: Sermide (*A. Manganotti*) and Francolini, province of Ferrara (*A. Fermioli*). In 1913 it was reported by Schiffner⁴ from the vicinity of Makó, Hungary (*J. Györfy*) and from Mesopotamia, Asia Minor (*H. von Handel-Mazzetti*). Stephani considered the Russian specimens distinct from *R. Frostii*, describing them as new under the name *R. Beckeriana*, but K. Müller⁵ reduces Stephani's species to synonymy, maintaining that it comes within the range of variability to be expected in a species.

¹ Bryologist 20: 33. 1917.

² Bot. Notiser 1898: 24.

³ Atti R. Ist. Veneto 71: 852. f. 7. 1912.

⁴ Oesterr. Bot. Zeitschr. 63: 455. 1913.

⁵ Rabenhorst's Kryptogamen-Flora 6: 210. f. 138.

In the absence of fresh material the writer has been unable to make a satisfactory study of the present species, but the published descriptions and figures bring out most of its essential characters clearly. Aside from the works of Heeg, Massalongo, and K. Müller, already alluded to, reference may be made to Underwood's account in the 6th edition of Gray's Manual, to Howe's critical observations in connection with the Hepaticae of California,¹ and to Miss Black's comprehensive morphological study.² Howe emphasizes the features of the spores, which distinguish the species from all known California *Ricciae*. He describes them as narrowly margined, 45–55 μ in maximum diameter, and covered over almost uniformly "by numerous short, delicate, wavy ridges which rarely anastomose." These peculiarities will serve equally well to separate *R. Frostii* from the other New England species of *Riccia*, in all of which the ridges on the spores form regular meshworks.

Whether *R. Frostii* should be retained in the genus *Riccia* or transferred to *Ricciella* is not altogether clear. The green tissue contains intercellular canals which extend, in some cases at least, from the compact ventral tissue to the dorsal surface. Whether they are always continuous for this entire distance, or whether they are occasionally subdivided by transverse or oblique partitions is not brought out by the descriptions. In any case the canals are broader than in typical species of *Riccia*, and instead of being bounded by only four cells in section view are bounded by several to many cells. In these respects they resemble the marginal canals described by Juel³ in the case of the European *R. Bischoffii* Hüb. Since the median canals in this species are of the narrow type, Juel contends that it shows the *Riccia* structure in the median portion and the *Ricciella* structure in the wings, thus forming a connecting link between the two groups and making it unnecessary to recognize *Ricciella* as a genus. In typical species of *Ricciella*, however, the intercellular spaces are in more than one layer, so that the genus might still be maintained on the basis of this feature. In the case of *R. Frostii*, unfortunately, this criterion can not at present be applied, and it therefore seems wisest to retain the species in *Riccia*, even if certain writers have considered it a *Ricciella*.

¹ Mem. Torrey Club 7: 32. 1899.

² The morphology of *Riccia Frostii*, Aust. Ann. Bot. 27: 511–532. pl. 37, 38. 1913.

³ Über den anatomischen Bau von *Riccia Bischoffii* Hüb. Svensk Bot. Tidskr. 4: 160–166. pl. 7 + f. 1–5. 1910.

2. *SCALIA HOOKERI* (Lyell) S. F. Gray, Nat. Arr. British Pl. **1**: 705. 1821. *Jungermannia Hookeri* Lyell; Sowerby, Engl. Bot. **36**: pl. 2555. 1814. *Mniopsis Hookeri* Dumort. Comm. Bot. 114. 1822. *Lejeunea Hookeri* Spreng.; Linnaeus, Syst. Veg. ed. 16, **4**: 234. 1827. *Gymnomitrium Hookeri* Corda; Opiz, Beitr. zur Naturg. 651. 1829. *Mniopsis acutifolia* Dumort. Syll. Jung. 75. 1831. *Haplomitrium Hookeri* Nees, Naturg. der europ. Leberm. **1**: 111. 1833. *H. Cordae* Nees, l. c. **1**: 112. 1833. On damp rocks, in a mat of *Pellia Neesiana* (Gottsche) Limpr., Huntington Ravine, Mt. Washington, New Hampshire, about 4800 feet altitude, August 7, 1917 (A. W. E.). New to America.

It is a great satisfaction to be able to record this rare and distinct species, representing a monotypic genus, as a member of our flora. Unfortunately the material collected is exceedingly scanty, consisting of a few antheridial shoots, but the plant is so different from all other northern Hepaticae that there is little danger of mistaking it. *S. Hookeri* was supposed to be confined to Europe, where it is widely distributed without being anywhere abundant. It was originally discovered in 1812 by Charles Lyell in the New Forest, Hampshire, England, near the southern coast, and is now known from several other localities on the British Isles and also from Norway, Sweden, Finland, Denmark, Germany and Austria. In the northern part of its range it sometimes descends to the sea level; in the southern part it seems to be confined to higher altitudes. The plants usually grow singly or in small tufts and are difficult to detect in the field. In most cases they occur scattered among other bryophytes, species of *Riccardia* or *Pellia* being perhaps their most common companions.

Full descriptions of *Scalia Hookeri*, many of them accompanied by figures, are available,¹ and the species served as the basis for an important monograph by Gottsche,² a work which ranks as a classic in the literature of hepaticology. It is therefore unnecessary to describe the plant in detail. It is hoped, however, that the following brief account of its more distinctive features may prove of interest.

¹ See, for example, the following: Hooker, British Jung. pl. 54. 1814; Carrington, British Hep. **1**. pl. 1, f. 1. 1874; Lindberg, Rev. Bryol. **12**: 33-36. 1885; Pearson, Hep. British Isles, 427. pl. 189. 1901; Warnstorf, Kryptogamenfl. der Mark Brandenburg **1**: 134. f. 1. 1902; K. Müller, Rabenhorst's Kryptogamen-Flora **6**: 399. f. 227. 190; Macvicar, Student's Handb. British Hep. 88. f. 1-8. 1912; C. Jensen, Danmarks Mosser **1**: 60. f. 1-3. 1915.

² Anatomisch-physiologische Untersuchungen über *Haplomitrium Hookeri* N. v. E., mit Vergleichung anderer Lebermoose. Nova Acta Acad. Leop.-Carol. **20**: 267-398. pl. 13-20. 1843.

The gametophyte consists of a pale subterranean rhizome which branches sparingly and from which the erect leafy shoots arise. Both the rhizome and the leafy shoots are wholly destitute of rhizoids. Slime papillae, however, are produced in abundance. The leafy shoots are mostly 0.5–1 cm. high and are usually unbranched. The leaves are composed of thin-walled cells and vary in shape, some being entire and others variously incised or lobed. The shoots, in the upper part at least, are radial and show no evidence of dorsiventrality; in other words their broad leaves are in more than three ranks and no distinction can be drawn between lateral leaves and underleaves. The lack of dorsiventrality distinguishes *Scalia* from all other genera of the Hepaticae, but in Stephani's opinion¹ this distinction is more apparent than real. According to his observations the leafy shoots are dorsiventral in the lower part, the leaves being in three ranks and showing a differentiation into lateral leaves and underleaves. This differentiation is not one of form or of size but simply of insertion, the lateral leaves being obliquely attached to the stem while the underleaves are transverse. Stephani notes further that the radial structure of the shoot appears only in connection with the sexual organs and that many other leafy genera show a similar approach to a radial condition in their reproductive shoots. However this may be, the shoots of the *Scalia* present a very distinctive appearance and bear a strong resemblance to mosses, their upper leaves being closely crowded.

Most authors assign a dioicous inflorescence to *S. Hookeri*, but Stephani states that it is sometimes monoicous and may be always so. These statements are criticised by Warnstorf and there seems, indeed, to be very little to support them. The antheridia are conspicuous from their large size and bright orange color. They are borne on short stalks and arise irregularly all around the stem, showing no definite relation to the leaves. The archegonia, sometimes as many as ten, are developed near the tip of a shoot, but the apical cell itself does not take part in the formation of an archegonium, even though its activities are brought to an end. No perianth is developed, the protection of the sporophyte being secured by a large and fleshy calyptra, the neck of the fertilized archegonium being in the usual apical position and the unfertilized archegonia remaining at the base.

The sporophyte shows the usual differentiation into foot, stalk and

¹ See Mém. Herb. Boissier 16: 43. 1900.

capsule, the stalk attaining (according to Lindberg) a length of 1-3 cm. The capsule is oblong-cylindrical, 1.5-2 mm. in length and 0.6-0.75 mm. in diameter. The wall consists of a single layer of cells, except in the apical region, and splits at maturity into four valves, although these may remain more or less united. The cells of the wall are thin-walled, except for a median annular band in each cell, extending longitudinally. This type of thickening recurs in the closely related tropical genus *Calobryum* Nees¹ but otherwise seems to be unique. In all other genera of Hepaticae, where annular or half-annular bands of thickening have been described, the bands run in a general transverse direction. The elaters are for the most part long and bispiral, although some of those which remain attached to the tips of the valves are unispiral throughout more or less of their length. The spores are densely verruculose.

The genera *Scalia* and *Calobryum* constitute a very natural group, to which Goebel² has given the name Calobryaceae. This group represents, in the opinion of most writers, the highest development attained by the anacrogynous Jungermanniales. The genus *Calobryum* in fact, as Goebel emphasizes, is not anacrogynous at all, the archegonia forming a definite apical group on the broadened tip of the female shoot. Of course this does not imply that the acrogynous Jungermanniales are descended from the Calobryaceae. The group, as Cavers³ states, appears "to form a blindly ending line of development," the probable origin of the true Acrogynae being in some less highly differentiated form.

3. *HARPANTHUS FLOTOWIANUS* Nees, *Naturg. der europ. Leberm.* 2: 353. 1836. *Jungermannia Flotowiana* Nees, *Flora* 16: 408. 1833. *J. convoluta* Hüben. *Hep. Germ.* 60. 1834. *J. vogesiaca* Hüben. *l. c.* 149. 1834 (as synonym). *Lophocolea vogesiaca* Nees, *Naturg. der europ. Leberm.* 2: 348. 1836. *Pleuranthe olivacea* Tayl. *Jour. Bot.* 5: 282. 1846. On damp, earth-covered rocks, mixed with other Hepaticae, Valley Way, Mt. Madison, New Hampshire, about 4700 feet altitude, July 9, 1917 (*A. W. E.*). New to New England.

The present species, which is the type of the genus, was based on material collected in the Riesengebirge, close to the boundary between Silesia and Bohemia. It is now known also from various other parts

¹ See Andreas, *Flora* 86: 204. *f.* 23, 24. 1899.

² *Ann. Jard. Buitenzorg* 9: 21. 1891.

³ *New Phytol. Reprint* 4: 99. 1911.

of Germany and Austria, as well as from Norway, Sweden, France and Great Britain. Lindberg and Arnell report it further from various localities in Siberia. For the most part it is alpine or sub-alpine in its distribution although it sometimes descends to the sea level in the northern part of its range.

In North America its distribution is still very incompletely known. According to the Synopsis Hepaticarum (1845) it was collected by Vahl in Greenland, but there seem to be no other reports about its occurrence on the island. In 1889 Underwood¹ showed that *Pleuranthe olivacea* Tayl., which had been redescribed and figured by Sullivant in the second edition of Gray's Manual (1856), was a synonym of *Harpanthus Flotowianus*. Taylor's species was based on material in the Hooker herbarium, collected by J. Drummond in "North America" and presumably coming from somewhere in western Canada. In 1890 Pearson² cited the species vaguely from the "Rocky Mountains (*Bourgeau*)," and Underwood, in his account of the Hepaticae in the 6th edition of Gray's Manual, included *H. Flotowianus*, reproducing Sullivant's figures of *Pleuranthe olivacea*. At the end of the description the words "extra limital" appear, but Underwood³ repudiated these two years later, stating that they had been added without his knowledge and that he had reason to believe that the species would be found in the northern United States. At the same time he reported it from Labrador (*Waghorne*), the specimens cited having come from Battle Harbor. In 1891 he had already recorded the plant from British Columbia.⁴ This record was apparently based on specimens in his herbarium collected by J. Macoun in the "mountains of the Gold Range, north of Griffin Lake," in August, 1889,⁵ although no statement to this effect is made. In 1900 the writer⁶ detected the *Harpanthus* among the specimens brought back by the Harriman Alaska Expedition and listed the following stations: Hot Spring (*Trelease*), Orca (*Trelease*), Port Wells (*Trelease*), and Yakutat (*Brewer & Coe*). In 1904⁷ he reported the

¹ Bot. Gaz. **14**: 196. 1889.

² List Canadian Hep. **18**. 1890.

³ The Hepaticae of Labrador. Bull. Torrey Club **19**: 269, 270. 1892.

⁴ Zoe **1**: 366. 1891.

⁵ See Macoun, Cat. Canadian Pl. **7**: 28. 1902.

⁶ Proc. Washington Acad. **2**: 306. 1900. Through an unfortunate oversight *H. Flotowianus* is not mentioned in the writer's recent "Report on the Hepaticae of Alaska," published in Bull. Torrey Club **41**: 577-616. 1915.

⁷ Minnesota Bot. Studies **3**: 142. 1903.

species from Grand Marais, Minnesota (*Holzinger*), but this record proves incorrect, the specimens in question representing a large form of *H. scutatus* (Web. f. & Mohr) Spruce. In 1906¹ he reported a new station for the plant from British Columbia, namely: Comox, Vancouver Island (*J. Macoun*). These scanty records seem to exhaust the list, and it will be seen that the stations from Greenland, Labrador, and New Hampshire are the only ones definitely known from eastern North America.

The genus *Harpanthus*, according to our present knowledge, is composed of only two species, *H. Flotowianus* and *H. scutatus*, the latter being widely distributed in northern regions and reaching a much lower latitude than *H. Flotowianus*. The genus is characterized by succubous, bifid leaves; large, lanceolate underleaves, usually undivided although sometimes sparingly toothed; ventral, intercalary branches, those bearing the sexual organs being very short; a rudimentary, erect perigynium, the sporophyte being partially imbedded in the swollen tip of the female branch; small involucreal leaves and a short perianth, terete in the lower part. In *H. scutatus* the ventral position of the branches seems to be constant; in *H. Flotowianus* an occasional lateral branch of the *Frullania* type is produced.² In its general habit the genus bears a strong resemblance to *Lophocolea* and *Chiloscyphus*. Its systematic position is intermediate between *Heteroscyphus* and *Geocalyx*, both of which have bifid succubous leaves and short sexual branches, ventral in position. In *Heteroscyphus*, however, there is a well-developed perianth and no perigynium (just as in *Lophocolea* and *Chiloscyphus*), whereas in *Geocalyx* there is no perianth and a well-developed perigynium.

Sporophytes are rare in *H. Flotowianus*, but it is usually not difficult to determine sterile material. The conspicuous lanceolate underleaves at once indicate the genus *Harpanthus*, while the somewhat larger size and the blunt lobes of the leaves will serve to separate it from *H. scutatus*. The leaves, to be sure, are subject to considerable variation. The apical sinus, although usually distinct, is sometimes scarcely apparent, while the lobes vary from rounded to more or less acute. Even if acute lobes are present, however, they are in the minority, while the lobes of the leaves in *H. scutatus* seem to be constantly acute. The latter species is further distinguished by the fact

¹ Postelsia 1906: 225.

² See Evans, Ann. Bot. 26: 12. f. 15. 1912.

that the underleaves are often coalescent on one side with a leaf; in *H. Flotowianus* they are constantly free. The two species differ finally in habitat. *H. scutatus* prefers logs or dry rocks, rarely ascending to a high altitude, while *H. Flotowianus* grows on damp rocks or in subalpine bogs.

Schiffner¹ recognizes two modifications of the species, which he designates as forma *typica* and var. *uliginosus*, respectively. He admits, however, that they intergrade. In the forma *typica*, to which the Mt. Madison specimens might be referred, the stems are more or less prostrate, and the lobes of the leaves are often sharp. In the var. *uliginosus*, the stems are more or less erect, and the lobes of the leaves are mostly rounded. Forma *typica* grows in somewhat drier localities and occasionally produces reproductive organs; var. *uliginosus* grows in deep swamps and is always sterile. Full descriptions of the species, with figures, may be found in European manuals.

4. CALYPOGEIA FISSA (L.) Raddi. On banks, Mt. Washington Carriage Road, New Hampshire, near the three mile post, August 7, 1917 (*A. W. E.*); on shaded earth, Triple Falls, Randolph, New Hampshire, August 23, 1917 (*A. W. E.*); Vineyard Haven, Martha's Vineyard, Massachusetts, August, 1917 (*H. E. Greenwood*). New to New England. In 1907² the writer published an account of *C. fissa*, giving a full synonymy of the species. At that time he was able to cite only two stations, namely: Lafayette, Louisiana (*Langlois*), and Devonshire Marsh, Bermuda (*E. G. Britton*). Nichols³ has since listed the species from Barrasois, Cape Breton, Nova Scotia, and the three following stations may now likewise be placed on record: Magnolia Swamp, Mt. Pleasant, District of Columbia (*M. B. Waite*); Gainesville, Florida (*N. L. T. Nelson*); and Boston Mountains, Swain, Arkansas (*W. H. Emig*). It is clear from these citations that the species is widely distributed in North America. Its range in Europe is equally extensive, and it has also been reported from Japan.

The species is characterized by shortly bidentate leaves and by wide and deeply bifid underleaves, the lobes of which are blunt or sharp and usually bluntly unidentate on the sides. When these features are at all constant, as in the material from Bermuda, the plant is easily distinguished from the closely related *C. Trichomanis* (L.) Corda. Unfortunately this is not always the case. In some

¹ Lotos 48: 332. 1900.² Bryologist 10: 29. 1907.³ Bryologist 19: 42. 1906.

specimens only a few of the leaves are bidentate and the underleaves are sometimes narrower, less deeply divided, and not dentate on the sides. These deviations are more likely to be found on slender branches and apparently indicate a reversionary tendency. At the same time they show that *C. fissa* is to be looked upon as a "kleine Art," even by those who recognize its validity as a species.

The additions to local state floras, not already mentioned on the preceding pages, are as follows: —

For Maine: *Diplophyllum gymnostomophilum*, Round Mountain Lake and vicinity, Franklin County (A. Lorenz).

For New Hampshire: *Pellia Fabroniana*, Beaver Falls, Colebrook, and Stewartstown (A. L. Andrews & A. W. E.); *Cephalozia macrostachya*, Eagle Lake, Mt. Lafayette (A. Lorenz); *Frullania Selwyniana*, Stewartstown and Colebrook (A. L. Andrews & A. W. E.); *Lophozia badensis*, Beaver Falls, Colebrook (A. L. Andrews & A. W. E.); *L. heterocolpa*, Beaver Falls, Colebrook (A. L. Andrews & A. W. E.), and Alpine Cascade, Berlin (A. W. E.); *L. Kaurini*, Beaver Falls, Colebrook, and Lime Pond, Columbia (A. L. Andrews & A. W. E.); *Anthoceros crispulus*, Cornish (C. C. Haynes) and Compton (A. Lorenz); *A. Macounii*, Compton (A. Lorenz). The specimens of *A. crispulus* from Cornish have already been reported under the name *A. punctatus*¹ and have served as the basis for the record in the writer's Revised List.² The sign "+" in the list should therefore be transferred to *A. crispulus*.

For Vermont: *Marsupella Sullivantii*, Mt. Mansfield (A. Lorenz).

For Massachusetts: *Cephalozia Francisci*, Granville (A. Lorenz); *C. macrostachya*, Woods Holl (H. E. Greenwood); *Lophozia inflata*, Sandwich (G. E. Nichols) and Stillriver, Harvard (H. E. Greenwood); *Nardia crenuliformis*, Granville (A. Lorenz); *Radula obconica*, Mt. Washington (A. Lorenz); *Scapania dentata*, Sheffield (A. Lorenz).

For Connecticut: *Pallavicinia Flotowiana*, Salisbury (A. Lorenz); *Sphenolobus exsectaeformis*, Lantern Hill, North Stonington (A. Lorenz).

The census of New England Hepaticae now stands as follows: total number of species recorded, 189; number recorded from Maine, 138; from New Hampshire, 149; from Vermont, 129; from Massachusetts, 117; from Rhode Island, 79; from Connecticut, 143; from all six states, 60.

SHEFFIELD SCIENTIFIC SCHOOL, YALE UNIVERSITY.

¹ RHODORA 7: 58. 1905.

² RHODORA 15: 26. 1913.

A WHITE-LEAVED HEMLOCK IN VERMONT.—Three years ago when wandering about a hillside pasture near my home in Grafton, Vermont, my attention was attracted by a tree standing some fifteen feet below the woods. A nearer view showed it to be a hemlock about six feet high branching thickly close to the ground and pointed at the top — the tips of all and a large part of some of the branches were whitish while the rest of the tree was of the usual green. This gave it a peculiar variegated appearance. The tree grows on a rather steep side hill; at one side about two feet away is a ledge which rises above the ground over three feet, on the other side and a trifle nearer is a large stone, above and below the land is clear of trees for some distance. It would seem that the soil might not be very deep at this point but I have never investigated. Many hemlocks are in the woods just behind this tree — two large maples are near the foot of the ledge and small trees and bushes are nearby. During these three years I have often been to this pasture and noticed this tree. I do not think there has been much growth but now much of the tree is bleached and only the lower branches give the clear green and white effect. It presents a striking appearance as it stands out clearly against the dark green of the other hemlocks.—AMY M. DAVIS, Grafton, Vermont.

[From Dr. Harold St. John, who has examined specimens of this tree at the Gray Herbarium, we learn that it is clearly the phase described as *Tsuga canadensis* (L.) Carr., *albo-spica* (Barron) Beissner, which has appeared in Europe and been perpetuated there by horticulturalists. It has never before been recorded as occurring in the wild state within the native range of the species.—ED.]

Vcl. 19, no. 227, including pages 237 to 256, was issued 5 December, 1917.

ERRATA.

- Page 7, line 3; for Kangelaksiorvik read Kangeluksiorvik.
 " 7, " 33; for Burnell read Burwell.
 " 7, " 34; for Ehortiarsuk read Ekortiarsuk.
 " 7, " 35; for Narvak read Navak.
 " 11, " 28; for *Crypta* read *Elatine*.
 " 12, " 38; before September insert Bowdoinham, .
 " 13, " 8 & 9; for Andelusia read Andalusia.
 " 15, " 22; for West read above.
 " 27, " 12; shift line to the left even with line 8.
 " 32, " 25; for *maritimum* read *maritima*.
 " 33, " 32; for Barrett read Barratt.
 " 51, " 34; for A. R. Weed read A. C. Weed.
 " 53, " 27; for Buchnell's read Bushnell's.
 " 54, " 6; after 1916 insert By M. S. Baxter.
 " 57, " 9; for ophioides read OPHIOIDES.
 " 101, " 40; for Homerstown read Hornerstown.
 " 102, " 1; for W. G. & read W. J. &.
 " 102, " 3; for Lippencott read Lippincott.
 " 102, " 5; omit vicinity of.
 " 102, " 37; for costal read coastal.
 " 104, " 11; for R. B. Bartram read E. B. Bartram.
 " 104, " 12 & 25; omit Jr.
 " 104, " 24; for Conard read Conrad.
 " 105, " 1; for coast read coastal.
 " 110, " 29; for *Picia* read *Picea*.
 " 122, " 35; for C. read CAREX.
 " 144, " 21; for 826 read 827.
 " 178, " 37; for *thelypteroides* read *thelypteroides*.
 " 178, " 37; for *thelypteroides* read *thelypteroides*.
 " 189, " 22; for Swamp read Stump.
 " 201, " 36; for *Filix-temina* read *Filix-femina*.
 " 210, " 42; for Betchouam read Betchouane.
 " 210, " 42; for Seignoiry read Seigniorry.
 " 215, " 29; for *cicutaria* read *cicutarium*.
 " 227, " 37; for *? read *×?
 " 252, " 35; for SILYBIUM MARIANUM read SILYBUM MARIANUM.

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